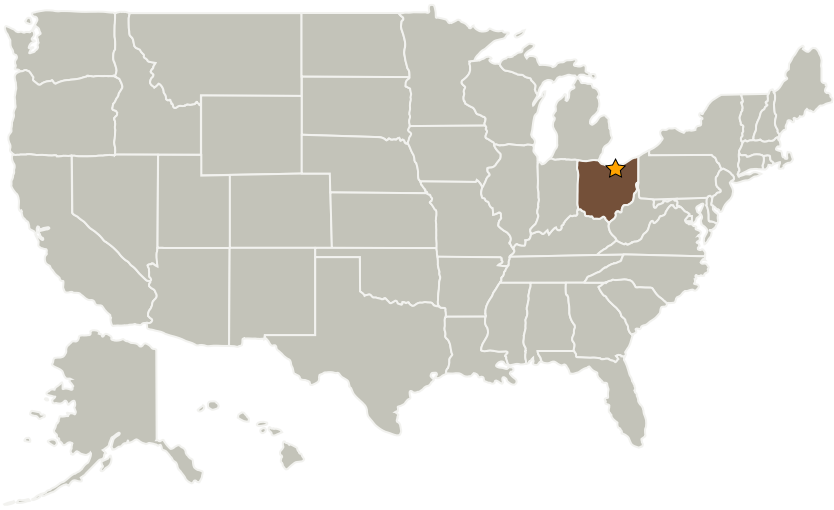
Lightweight High Temperature Beta Gamma Alloy/Process Development for Disk and Blade Applications, Phase I

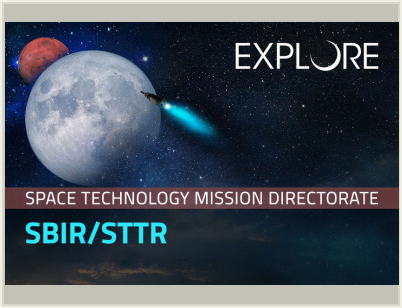
Completed Technology Project (2008 - 2008)

Project Introduction

The primary material and manufacturing limitations of gamma TiAl alloys include processing difficulties, requiring costly non-conventional processing requirements, and large lamellar grains, which reduces damage tolerance. We have developed a new class of TiAl-based alloys, called beta gamma, which would remove such barriers. Unlike existing gamma alloys, beta gamma alloys are designed such that the ductile â phase is adequate at elevated temperatures (for processing) but negligible at the anticipated use temperatures (for performance). The alloys also feature significant grain refinement and compositional homogeneity. This program is aimed to utilize such beneficial beta-phase distribution and microstructure features observed in small (0.7kg) samples into forged disks from medium size (25kg) ingots. The process-ability will be validated by employing a conventional forging process, and refined lamellar microstructures will be generated through usual alpha treatments. The significance of this innovation is that beta gamma alloy disks can not only be produced by conventional forging, but also show improvements in RT strength and ductility and may retain other attributes (density, creep and oxidation) of conventional gamma alloys.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
UES, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Dayton, Ohio

Primary U.S. Work Locations
Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Young-won Kim

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.8 Smart Materials